Abstract of the Invention

A new class of proteins and methods related thereto are presented. The proteins, which can be characterized as catalysts of the extension of plant cell walls and the weakening of the hydrogen bonds in pure cellulose, are referred to as expansins. Two proteins have been isolated by fractionation techniques from washed wall fragments of cucumber hypocotyls, referred to as "cucumber expansin-29" and "cucumber expansin-30" (abbreviated cEx-29 and cEx-30, with respect to their apparent relative masses as determined by SDS-PAGE). Moreover, three peptide fragments from the purified cEx-29 protein were sequenced, then oligonucleotide primers were designed to amplify a portion of the expansin cDNA using polymerase chain reaction with a cDNA template derived from cucumber seedlings, and then the PCR fragment was used to screen a cDNA library to identify full length clones. Another expansin protein has been isolated from oat coleoptiles (oat expansin oEx-29), while three additional expansin sequences have been identified in Arabidopsis and an additional two in rice. Expansins appear to be broadly distributed throughout the plant kingdom and can be identified in stem and leaf vegetables (i.e., broccoli, cabbage), fruit and seed vegetables (i.e., tomato), fiber crops and cereals (i.e., corn), and forest and ornamental crops (i.e., cotton). An expansin, generally, is a protein which has at least about 60% sequence similarity with the amino acid sequence shown in SEQ. ID. NO:1, and preferably has at least about 70% sequence similarity with SEQ. ID. NO:1.